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THE DEVELOPMENT OF DESIGNS FOR CURRICULUM RESEARCH, IMPLICATION OF THE CONFERENCE ON FUNDAMENTAL PROCESSES IN EDUCATION.

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A REPORT ON IMPLICATIONS FOR FUTURE RESEARCH ACTIVITY TO BE SPONSORED BY THE U.S. OFFICE OF EDUCATION WAS PREPARED AS AN ADDENDUM TO THE CHAIRMAN'S REPORT OF THE WOODS HOLE CONFERENCE ON FUNDAMENTAL PROCESSES IN EDUCATION, HELD UNDER THE AUSPICES OF THE NATIONAL ACADEMY OF SCIENCES DURING SEPTEMBER 1959. IMPLICATIONS FOR FUTURE RESEARCH WERE ORGANIZED IN FIVE CATEGORIES--(1) THE IMPORTANCE OF STRUCTURE IN TEACHING AND LEARNING, (2) THE RELATIVITY OF LEARNING READINESS, (3) THE BALANCE OF INTUITIVE AND ANALYTIC THINKING, (4) THE NATURE OF ADEQUATE MOTIVES FOR LEARNING, AND (5) THE PROPER USE OF AIDS TO TEACHING. A FINAL RECOMMENDATION HIGHLIGHTED THE NEED FOR FORMULATING A U.S. OFFICE OF EDUCATION POLICY ON CURRICULUM DEVELOPMENT AND FOR CREATING A CLEARINGHOUSE DEVOTED TO CURRICULUM DEVELOPMENT INFORMATION. (JM)

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FINAL REPORT

to the

United States Office of Education
Department of Health, Education, and Welfare

U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
Office of Education
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"THE DEVELOPMENT OF DESIGNS FOR CURRICULUM RESEARCH",

Implication of the Conference on Fundamental Processes in Education
Sponsored by the National Academy of Sciences
Woods Hole, Massachusetts
September 9-18, 1959

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April 6, 1960

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MEMORANDUM

To: Dr. Roy Hall
Assistant United States Commissioner of Education
United States Office of Education

From: Professor Jerome S. Bruner, Chairman
Conference on Fundamental Processes in Education
National Academy of Sciences

Re: Implications of the Conference on Fundamental Processes in Education for the United States Office of Education

The following memorandum is prepared as an addendum to The Process of Education, the Chairman's Report of the Wood's Hole Conference on Fundamental Processes in Education, held under the auspices of the National Academy of Sciences, during September, 1959. A grant from the Cooperative Research Program of the U. S. Office of Education to Harvard University helped finance some of the work of the Chairman carried out in connection with the Conference. The objective of the present memorandum is to explore some of the implications of the Conference for the various research programs on education being supported by the United States Office of Education.

The Report emphasizes five areas in which research and planning could fruitfully be carried out in support of work on curriculum for primary and secondary schools. These areas are:

1. The importance of structure in teaching and learning.
2. The relativity of learning readiness.
3. The balance of intuitive and analytic thinking.
4. The nature of adequate motives for learning.
5. The proper use of aids to teaching.

In discussing implications for future research activity sponsored by the United States Office of Education, it is perhaps best to use the same subheadings.

1. The importance of structure in teaching and learning. It has been the major premise of virtually all of the curriculum projects that have been in operation for the past five years that the principal problem in constructing an adequate curriculum is to find a way of giving students a sense of the underlying structure of a subject matter -- to lead them to grasp the major generalizations in a field in such a way that the material can be used with soundness and skill. I need not repeat here the long discussion contained in The Process of Education detailing the views of the Conference on this issue. Let me instead point to a major implication of the idea of structure for future research support.

Up to now, the bulk of research activity in education and educational psychology has gone into problems of educational administration or into studies of the effect of certain kinds of activities on the learning or motivation of students or into the evaluation of various kinds of programs. Over and beyond this, there has also been support for the study of certain basic processes of learning, motivation, etc., related to the educational process. On the whole, there has been very little support given or stimulation of work on the actual nature of a curriculum looked at as an optimum form of communication. That is to say, there has been perhaps too little attention paid to the contribution to education that can be made by research on how best to teach evolution or gene theory or the nature of drama or equations. Such research requires the joining of the efforts of an expert in a substantive field of scholarship, one experienced in teaching children, and a psychologist skilled in studying and evaluating the learning process. It seems to me that this is the basic team that is needed if progress is to be made in developing teaching strategies for presenting material in an effective manner in the classroom.

The point will be raised whether such efforts to design optimum teaching units can be carried out at a level less ambitious than, say, presenting the "basis of physics" or "number theory" or the like. Ideally, to be sure, curriculum efforts of this sort should be comprehensive in the sense that they should attempt to derive as many particulars from a general view of a field of study. Yet, since comprehensive efforts require, as we know from the work of the Physical Science Study Committee and the School Mathematics Study Group, rather elaborate organization, one may legitimately ask whether it is not possible to operate effectively on a more modest scale. Let me take some examples to illustrate the kind of scale I have in mind. Take for example, the presentation of the American Revolution in a history course. There is certainly room for several smaller projects combining the skills of a first-class American historian, a highly experienced teacher of history, and a psychologist. The effort might involve trying to "derive" as much as possible about what happened during the Revolution from a few basic givens -- economic, political, and social with principal emphasis upon figuring out the consequences of various events and conditions. A similar effort might be made in the field of geography, a field that is often taught with a needless dullness occasioned by the amount of brute fact a child is presented in the course of a term. Might geography also be organized around a series of conjectures? For example: most civilizations had their origins in fertile river valleys or in alluvial plains at the edge of the sea. Why? What can be inferred about the location of cities from this fact, about the population of cities in various locales? Or take the distribution of the population of cities in any country. Such distributions have an interesting uniformity. How account for this regularity? Many subfields can be enlivened and made the occasion for deeper thought on the part of pupils if they could be revisited by the expert-teacher-psychologist team. I am of the view that the Office of Education should take a leading hand in encouraging the formation of such teams.

The uses to which the products of such labor can be put are many. Carried out in the context of curriculum planning at the state level, there would be immediate applicability to local school problems. It goes without saying too that work of this kind would be useful for the textbook writer seeking to prepare materials to fit school requirements. Indeed, one might well imagine

that the products of such work might form the basis for "teaching monographs" smaller in scope than a textbook and principally for the use of teachers in preparing materials -- regardless of what textbook they were going to use. In general such material might well provide material of the highest utility to teachers preparing to teach a subject, regardless of whether they were going to use the prepared material in the form presented or not. For material of this kind could only have the effect of making teachers more thoughtful and skillful in their own efforts to teach.

In sum, I do not think that we can possibly overestimate the importance of the kind of team to which I have been referring here: the able scholar, the seasoned teacher, and the psychologist able to assess the effectiveness of materials being prepared.

2. Relativity of learning readiness. The point has been made repeatedly by both friends and critics of the American educational system that we delay the teaching of so-called "hard" subjects too long. There are various experiments now going on designed to discover whether certain subjects might not be taught earlier and with more effect. The work of David Page and the Illinois Arithmetic Project, of Suppes at Stanford, and of others is of great interest in this connection. It might well be the time to bring together the various people who have been concerning themselves with such work to discuss next steps. There is a rather long discussion in the Wood's Hole Report detailing some of the kinds of experimentation needed in this area. The discussion is premised on the idea that the earlier one can introduce a subject into school, the better the chance to develop mastery of it in the sense that there will be more academic years available for follow-up. But in point of fact, our schools have been accused of having too little follow-up or continuity. In consequence, the Conference members raised the question of the feasibility of a "spiral curriculum" in which a revisit to certain basic themes is planned with the objective of deepening understanding of certain basic ideas on later encounter. The spiral curriculum is a means of balancing the ideal of coverage, urging as much emphasis upon depth in any subject as upon breadth. In line with the suggestion made in the preceding section, it might also be worthwhile at this point to consider what can be done to increase continuity in curriculum from grade to grade -- or, indeed, simply to raise the question whether we are doing enough to provide a cumulative experience for the child going through American schools.

3. Intuitive and analytic thinking. A section of the Report is given over to exploring the means whereby students can be made to be somewhat more daring and intuitive in their thinking and school work. Several types of research are suggested in that section. I am not of the opinion that research of this order need be given high priority by the Office of Education, for much of the preliminary work may better be done outside the school or immediate educational context. It seems to me, however, that it might be worth exploring whether anything might be accomplished by examining courses designed to help children learn how to study. There have been various experiments made on the "how-to-study" course and it would be interesting to see whether much has been accomplished and whether something more might be done by trying out various techniques for loosening up the conjectural tactics of children.

4. Motives for learning. There is no shortage of work on the motivation of learning. It is a major research emphasis. What is missing is good research

on long-term motives that operate for the accumulation of knowledge and attitudes over a student's academic lifetime. It was one of the themes of the Conference that emphasis upon intrinsic rather than extrinsic motives was of prime importance here: how to arouse interest rather than how to get a student to work for rewards that are outside the activity of learning itself. It was our feeling that one could progress in this sphere principally by changing patterns of teaching -- through new conceptions of curriculum and new conceptions of how to teach them. This is not to say that the problem of the school culture and the relative value it places on studies in contrast to other activities is not important. It obviously is. But it is also obvious that something is being done about the "school culture" problem at the present time. What is perhaps most interesting and neglected by way of research at the present time is work on the change of attitude and motive that arises when one introduces first class curriculum changes, notably in fields where curriculum patterns had become particularly cobwebby. We shall have an opportunity in the next years to observe the effects of curriculum reforms in various subjects, and I think it would be particularly germane to find out how the new courses change attitudes toward learning and thinking and studying in general as well as in a particular subject matter field.

5. The balance of teaching aids. The Wood's Hole Report attempts to distinguish four types of teaching aids -- ones designed to extend the experience of the student beyond its normal range, ones designed to quicken the conceptual process by presenting a model or embodiment of an idea in simplified or "noiseless" form, devices for dramatizing ideas or events, and devices for automating some of the teacher's job. Film, TV, teaching machines, etc., are looked at from the point of view of the function they serve and can serve, and the array of teaching aids reconsidered in the light of the triple role of the teacher as communicator of knowledge, competence model, and identification figure.

Several important points emerged at Wood's Hole concerning teaching aids -- emerged from a discussion that was often very heated, for the subject of teaching aids at the moment generates about equal parts of heat and light. The first was that the utility of aids increases directly as a function of one's sense of what one wants to do with them! Enthusiasm about audio-visual devices or about TV or teaching machines is a little bit like enthusiasm about a particular kind of ski that loses sight of the kind of skiing one wants to use them for. The enthusiasts for visual aids or other devices, it is abundantly clear, are the servants and not the masters of the curriculum designer. A "system" of aids can be used to get one toward an educational objective. It is never an objective in itself.

I foresee certain difficulties facing the Office of Education because of provisions in the National Defense Education Act specifically for the development of audio-visual aids. Not that the provision is unwise in principle. Rather, I think it may represent something of a temptation for enthusiasts to go ahead in producing materials that have insufficient bearing on any curricular objective. Again, it does not necessarily follow that such efforts will be worthless -- far from it. Indeed, there is plenty of room for the inspired film on the DNA gene molecule, for the teaching machine program on Elizabethan poetry, for exemplifying slides on the structure of crystals, and for the Harvey White physics course. The point, rather, is that one can derive so much more from aids when they are brought into concert and used in a manner that aids in the pursuit of an educational goal.

I should think that one step that might be taken in the administration of the NDEA provision regarding the development of audio-visual aids would be to give priority, all other things being qualitatively equal, to projects that have two characteristics: (a) that they formulate clearly the curricular objectives at the base of the development work, and (b) that the project consider the range of possible aids available for use in pursuit of their work. Yet, at the same time one must be realistic about the importance of enthusiasm in generating worthwhile work. The aficionados of teaching machines, for example, are not easily to be talked into considering how one might also use films in designing a school program. Be that as it may, and if the work is of high quality, one need not demand that such be the case. As a minimum, however, one should insist that research and development on any kind of teaching aid have clearly and explicitly in mind how the use of the aid relates to the functions that must be performed by the teachers who are supposed to use them. One too often finds among enthusiasts for various forms of teaching aids an implicit ignoring at best or an explicit contempt at worst for the teacher who will be responsible for classroom use. The idea that the "machine will replace the teacher" is essentially silly, but more important, it is dangerous to the morale of teachers and can only increase resistance to innovation in the teaching profession.

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Finally, it seems to me that developments of the past several years make it imperative for the Office of Education to formulate a much more explicit policy with respect to its role in curriculum development. With physics, mathematics, chemistry, geology, biology, history and various other fields witnessing ferment and often great forward strides in the development of new school curricula, there is very much needed a clearing house, a central source of discussion, and a place where curriculum projects can turn for advice and aid. To some extent, this function is now being served by the National Science Foundation. But there are several reasons why the Foundation cannot do a balanced job in this area over the long haul. The first and most obvious is that the NSF is exclusively concerned with science, and it is abundantly clear that the task ahead involves considerable work in the social sciences and humanities. It is also apparent from recent developments that the NSF is not going to expand its effort easily into the primary grades, K to VIII specifically. Yet the problem of progressive continuity in curriculum design demands that it is precisely to these grade levels that we should be turning our attention. Finally, the NSF does not have a long established relationship with school administrators, teachers, and curriculum specialists, and it seems to me essential that there be a constant exchange between people of this kind and the expert-teacher-psychologist team to which reference was made in the opening pages of this memorandum.

All of these matters point, I think, to the need for formulating a policy on curriculum development at the level of the U. S. Office of Education -- even to the degree of giving special responsibility for curriculum development to one executive of the Office.

April 6, 1960